SYMONS'S

MONTHLY

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## METEOROLOGY IN FRANCE.

WE fear that the above title is rather too large for the remarks which we are about to offer. Half-a-dozen numbers of this Magazine might be filled with descriptions of what is now being done for Meteorology in France. We cannot spare that amount of space, but, on the other hand, our readers ought to be made aware of the vigorous and systematic way in which the Bureau Central Météorologique has set to work. It was only established, on the recommendation of M. Bardoux, by the decree of Marshal MacMahon dated May 14th, 1878, and it was probably some time after that before Prof. Mascart was appointed director. Thus it is certainly far less than two years since the office was started. In our number for June, 1879 (page 73), we reviewed the first publication of the office, an octavo pamphlet of instructions for observers. Some months since we received the first quarto volume of the Annales of the Bureau,* and we commence the present article with a summary of its contents.

The introduction starts with a reprint of MacMahon's decree establishing the Bureau, and is followed by a few words from Prof. Mascart gracefully recognizing Le Verrier's services to Meteorology. These are followed by a list of the council appointed to advise with the director respecting the proceedings of the Bureau. The work of the office is then briefly noticed under three heads—Storm warnings, Climatology, and General Meteorology.

**Storm Warnings.**—This branch continues the *Bulletin International*, which was originated by Le Verrier, and is the model from which the English, and all other, Daily Weather Reports have been more or less copied. It also issues the storm warnings both for marine and agricultural purposes, the latter being developed to a remarkable extent, as there were at the date of the volume before us 580 communes, which subscribed the sum necessary to ensure the despatches being regularly telegraphed to them.

* *Annales du Bureau Central Météorologique de France. Année* 1878. *Etude des Orages en France et Mémoires divers.* Paris: GAUTHIER-VILLARS, 1879. 4to, xv.-162 pages, and 47 plates.

**Climatology.**—On this subject we translate Professor Mascart's own remarks :—"To ascertain the climate of France the assistance of a large number of observers is requisite. The regional or departmental commissions can render the greatest service by stimulating the zeal of the observers and by detailed study of each region, but their labours will only be of real utility when they are conducted upon uniform methods, at any rate as regards the more important phenomena. Nevertheless, before making any change in the existing organization it has appeared desirable to ascertain the state of the different commissions, the number and condition of the stations, their labours and their resources." A series of questions was therefore issued, the result being to show that there exist almost everywhere men who are ready and willing to further the progress of meteorological research, and only waiting for precise and uniform directions.

A long and carefully prepared circular was, therefore, drawn up and signed by the Minister of Public Instruction (M. Jules Ferry), and sent to all the Préfets, sketching out the composition, work, and resources of the commissions. We need not enter into the details, but, roughly speaking, the effect is to create a large number of small Meteorological Societies all over France, the presidents or delegates of which are invited to a general meeting in Paris once each year.

Similar steps have been taken in order to reorganize the observations made at the Normal Schools, and a very stringent circular was issued to the director of each school on April 23rd, 1879.

Upon the request of M. Lalanne, and with the consent of the Council of the Association Scientifique, the Minister of Public Works decreed that the grant hitherto made towards the cost of publishing the *Bulletin Météorologique de l'Association scientifique de France* should be transferred to the Bureau central météorologique, and, therefore, in future that office will print all the rain records kept by the Ponts et Chaussées, along with those from the Observatories, from the Normal schools, from private observers, and from the departmental commissions.

Lastly. Our readers are probably aware that Forestry, a subject which is entirely neglected in England, receives considerable attention in France, one of the Under Secretaries of State being "Directeur des Forêts," and having a large staff of foresters under his control. It is proposed that all these men shall be called upon to send in Natural History notes, or, as we call them in this country, records of phenological phenomena.

**General Meteorology.**—This section of the introduction appears to us to merit unabridged translation, as several of the points have never to our knowledge been more clearly expressed.

"Enquiries into the average distribution over the globe of the principal meteorological elements, such as pressure, temperature, cloud, wind, &c., will some day enable us to lay down the general laws of atmospheric phenomena, or the prevailing conditions during

each season, and to analyse their mechanical causes. Regarded from this purely scientific point of view, the study of general meteorology is of great importance, and we shall endeavour to assist in its advancement.

"On the other hand, weather forecasting, which may be considered to be the principal object of a meteorological service, is based on acquaintance with the phenomena indicated by each day's observations; but the existing state of the atmosphere alone is insufficient, and one must take into account the normal conditions, the dynamic equilibrium which would ordinarily prevail, and which reacts upon all accidental disturbances. Identical conditions may, therefore, according to the season of the year, lead to very different forecasts. Thus it is, that questions of general meteorology prove important even from a purely practical point of view. As to the disturbing phenomena, the squalls which so often pass over these regions, it is necessary to follow them uninterruptedly in order to ascertain their various phases and mode of propagation.

"We ought, then, to devote ourselves to the resumption of the study of the general movements of the atmosphere, and in order to profit by the progress already made, we have thought it well to base our researches upon simultaneous observations.

"The idea of simultaneous meteorological observations appears to be rather old. Without going back to Lamarck, who seems to have suggested observations of this class at the beginning of the century, Le Verrier had called attention to its great importance, and wrote in the Introduction to his *Atlas des mouvements généraux de* 1864, published in 1868, the following lines:—

"'At the commencement of such a work it would have been very difficult, if not impossible, to ensure that all the observations (on ships) were simultaneous. It is a feature much to be desired, but only to be secured in a time more or less remote, and it is of the highest importance that the maps should represent the state of the atmosphere over the ocean at the same instant of time, in order that one may follow the variations from day to day.'

"The realization of this project has been more prompt than Le Verrier hoped. In accordance with a proposal submitted by General Myer to the Vienna Congress in 1873, a very large number of Continental stations now observe at a single instant of absolute time, viz., at 0h. 53m. p.m. Paris mean time.

"But one observation per diem is scarcely sufficient to enable us to trace the development of a violent phenomenon, as is shown by M. Rollin's 'Memoir on the Storm of February 20th, 1879,' and we have proposed to add to the 0.53 p.m. observation, another six hours later. With the morning despatches, we should thus have three successive observations each day, and although night observations would still be wanting, we should nevertheless be able to study more closely the general movements of the atmosphere.

"But on account of the vast extent of the oceans it is evident

that observations at land stations alone will be insufficient, and that the assistance of mariners is necessary. The Government has made these observations compulsory on all the vessels of war crossing the Atlantic. Many of the steamship companies have recommended the same observations to the captains of their vessels, and we may hope that the whole mercantile marine, at any rate all sailing vessels, will afford us their valuable aid.

"Already the Chamber of Commerce at Havre has, at our request, made an annual grant in order to encourage these marine observations. Other Chambers of Commerce, to which we have not yet applied, will doubtless respond to our appeal with equal liberality, as indeed they did when Le Verrier requested their aid. Moreover, the Council of the Association Scientifique de France, desirous of continuing the encouragement which it has hitherto given to the development of meteorology in our country, has decided that a certain number of medals shall be distributed each year to the most zealous observers, and that an important proportion of these distinctions shall be awarded for observations made by merchant captains.

"Still, ships are moving observatories which vary little from regular tracks. Perhaps the time will come when the importance of meteorological studies will be considered sufficient to justify the despatch of vessels to cruise in important localities. At present we must do our best with all the fixed stations which it is possible to establish along the coasts and on the islands, where the numerous and intelligent staff at our consulates may render great service. And in order to obtain this aid, a circular was issued by M. Waddington to certain consuls on the shores of the Atlantic and of some of the European seas."

Then follows the address delivered at the first general meeting of the Council by its President, Hervé-Mangon. We regret that we can only spare space for a few paragraphs.

"For many years those savants who were interested in the meteorological service have desired to see it independent of the Astronomical Observatory. But it would neither have been just nor prudent to have taken from Le Verrier that international meteorological service which he had had the glory of creating in our country; but as soon as circumstances allowed, the re-organization of the service was carefully considered."

M. Hervé-Mangon then explains fully the steps taken to organize the present office, and to bring the stations throughout the country into accurate and harmonious working. The position of France with respect to the International Congresses is set forth as follows :—

"You are aware, gentlemen, that since the memorable Brussels Conference of 1853, France had not taken part in the International Meteorological Congresses, and that it was not represented at Vienna in 1873. It is useless to dwell on the causes of this state of things, which was as painful to French meteorologists as it was injurious to the progress of science itself; however, it was necessary in every

respect to terminate this unhappy isolation when our service was being re-organized. The Exposition of 1878 offered a favourable opportunity for entering into personal relations with the savants of other countries. With this object the Meteorological Society of France organized a free International Meteorological Congress. A large number of savants responded to its appeal. The meetings, both public and private, were most cordial. Some weeks afterwards M. Mascart was requested by our guests, as I had desired, to join the permanent committee charged with the *interim* questions respecting the international meteorological service, and with preparing for the approaching Congress at Rome.

"France, diplomatically invited, was represented at the Congress at Rome in April, 1879, and I am glad here publicly to thank the Italian meteorologists for the cordial welcome which they accorded to the French delegates. At the close of the Congress M. Mascart was re-elected a member of the permanent committee. French science has thus resumed in the international meteorological service the place which it ought naturally to hold."

After remarks upon internal arrangements respecting Weather Telegraphy, M. Hervé-Mangon proceeds to notice the question of American weather warnings; but (we hope accidentally) he omits all mention of what has been done by the *New York Herald*. He says:—

"We see, then, that it is beyond all things necessary to improve and to increase the area of international telegraphic despatches. We have reason to hope for great progress in this respect. France will doubtless soon receive a daily despatch from the United States Signal Office, which will be of great interest, both theoretical and practical; not only will it acquaint us with the atmospheric conditions prevailing over the vast area of the American Republic, but moreover it will enable us to trace exactly the route of the depressions which cross the ocean towards us, and which have so great an influence on our weather. The Signal Office receives immediately upon their arrival at New York copies of the observations made on board the Transatlantic steamers. Thanks to these documents, we can follow on the ocean, day by day, step by step, as one might say, the variations of the barometer and thermometer. It is then easy to ascertain whether a squall starting from the American coast, travels regularly towards France, wanders from the route, or becomes extinct, exhausted, in fact, by the length of its journey. If these valuable data were regularly sent to us, we should know for certain that a certain depression met some days since by a steamer close to Newfoundland had been, on previous days, observed by other vessels on the direct route for Havre or Bordeaux, and thence we might predict almost to an hour the time at which it would reach our shores. And, again, our relations with Africa, coupled with the American despatches, will, I am persuaded, in a few years enable us to furnish to mariners leaving our ports, most useful information as to the winds

prevailing over the ocean, to trace for them beforehand, as Maury suggested, their routes across the sea."

We must not stop to notice all the remarks in this report, but limit ourselves to two others.

M. Hervé-Mangon draws attention to the importance of absolutely true time being kept at all the stations provided with self-recording instruments, and suggests that they should have a special wire uniting them with the nearest astronomical observatory. We fear, from this suggestion, that the English plan of sending a time signal to every telegraph station in the country is not yet adopted in France. If it is not, the sooner our French friends copy the English plan the better; it is not often that we are ahead of them in matters semi-scientific and semi-official. If time signals have not been introduced, they should be at once; if they have been, the observatory clocks ought to suffice for the rest.

M. Hervé-Mangon is not only a Past-President of the Meteorological Society of France, but he is also well known as one of the leading authorities upon agricultural questions: this lends a special weight to the following remarks:—

"Lastly. I would express a desire which you all can fulfil, if, as I hope, you are willing to do so. I think that meteorologists too often neglect observations of animal or vegetable physiology. The dates of the arrival and departure of migratory birds, the leafing and flowering of plants, and the ripening of corn should be noted in each district. And, in the interests of agriculture, I would specially urge careful registration of the date of sowing and harvesting the principal crops, and of cutting the hay near the observatories. This would soon give for each department facts of considerable practical importance, for one could predict, more than a month beforehand, within two or three days, the date of the harvest, and furnish agriculturists with other data of equal utility. Even as a question of pure science, I will add that plants are invaluable instruments, the observation of which will furnish valuable information respecting slow climatic changes, which, up to the present time, we are far from possessing,"

The rest of the volume is composed of a series of beautifully illustrated memoirs upon the storms which passed over France during 1876 and 1877; and of articles on observations of temperature, by M. Edmond Becquerel; on the reduction of barometric readings to sea-level, by M. Angot; and on phenological phenomena and frosts in Sweden, by M. Hildebrandsson.

From one of the papers by M. Fron we extract the following account, by M. Legendre, of a whirlwind at Heiltz-le-Maurupt, 120 miles east of Paris:—

"I was in the hall of the Mairie when the storm of Feb. 20, 1876, broke. To the west of the town there appeared a storm, but not of a specially threatening character. I heard two peals of distant thunder; ten minutes afterwards, at 4.30 p.m., I heard a sudden and

extraordinary noise. I could not account for the nature of this noise, which sounded somewhat dry, like falling hail, or that of a great conflagration. I turned my head and saw fragments of all kinds carried obliquely in the air—tiles, slates, stones and wood—a frightful cloud. I thought that no building could resist it. To turn round and advance a few steps towards the door was the work of an instant, during which a shower of glass and slates burst into the hall. The windows were thrown on the floor, the chimneys fell, and walls were thrown down. A second had sufficed, and the tempest had passed. Then, looking through the windows, I could see the havoc produced: houses ruined, parts of walls thrown down, the entire roofs of other dwellings carried away, and the streets filled with fragments. A young girl had been buried under a mass of bricks, but was drawn out alive. The total loss in furniture and buildings was 150,000 francs (£6,000). The storm had begun about 150 yards from the first houses. The lightning did no harm, except within 15 or 20 yards on each side of a straight line. Some lime trees which had stood for centuries were broken. The parts of the walls thrown down are those facing east, although the storm came from the west. A low wall surrounding a garden had every stone thrown down. One solidly-built house presented a grievous appearance. A stone chimney pot had been carried 200 feet over the roofs of neighbouring houses. A large fir, broken off 6 feet above the ground, had been carried into a court-yard separated from the garden by lofty buildings."

We cannot stop to notice all the interesting features of this work; we must indicate a few, and pass on M. Olry gives, on page A 15, a very clear description of a waterspout; M. Hébert, on page A 29, gives a full account of the damage by floods in October, 1876, at Vicq, in Haute Vienne; and on page A 42 the same high authority is quoted in support of hailstones weighing 250 grammes (nearly nine ounces) having fallen on June 22nd, 1876. In June, 1877, M. Piche reports that hailstones which "averaged as large as a fist," fell at D'Asson, near the Pyrenees. In August, 1877, M. Lespiault reports hailstones as large as geese's eggs; and that at Beauregard, near Terrasson, two were found weighing respectively 500 grammes (1 lb. 2 oz.), and even 800 grammes (1 lb. 12 oz.). The same gentleman is responsible for the statement, on page B 24, that of certain strokes of lightning—"Enfin, une seule (coup de fondre) a atteint une personne le 19 juin sur le territoire de Serqueux près Bourbonne, et l'a dépouillée complétement de ses vêtements sans qu'aucune trace du passage du fluide électrique ait pu être remarquée."

*(To be continued.)*

## EASTER AT THE SORBONNE.

CONSIDERED as a gathering of scientific men, and as an occasion for the beneficial interchange of thought, the meeting of 1880 must be re-

garded as a success; but judged by the meteorological papers read, it was a failure. The only papers at all bearing on Meteorology were—

M. ALLUARD (director of the Meteorological Observatory on the Puy de Dôme). *On the Winter of* 1879-80 *at Clermont and on the Puy de Dôme.*—The leading feature of this paper was the great difference in temperature which had prevailed between Clermont and the station on the summit of the mountain, the higher station having been frequently, and greatly, warmer than the lower one. On one occasion the difference amounted to 36°·6. During two and a half months there were 51 nights on which it was warmer on the mountain than at its foot. There were two special features in the winter of 1879-80 at the lower station at Clermont—(1), the prevalence of fogs, which, owing to the dryness of the air and the distance of Clermont from any river, are usually very rare; (2), the severity of the frost, which, on December 6th, culminated in the temperature of —10°·3 F.

M. MASURE (member of the Horticultural Society of Orléans). *Observations on the Evaporation of Water, and on the Transpiration of Plants.*—This was a partly experimental, and partly theoretical, paper. The experiments had chiefly been made by very accurately determining the loss of water by weight. The author remarked that the evaporation from wet ground is greater than that from water; that even when air is only damp (say the humidity not above 80) moisture is often deposited on the earth; that it is certain that the consumption of water by plants is not wholly due to evaporation from their leaves; that the true amount of evaporation is at present badly determined, but that is really merely a question of the interchange of vapour between the clouds and the earth, dependent on their respective temperatures. This view the author developed in a formula, by which he said that the amount of evaporation could be computed from ordinary meteorological readings. But as we did not see that the velocity of the wind was included in the formula, we do not reproduce it.

M. NIEPCE. *On the Variations of the Climate of Nice during* 1878-79. —This could hardly be called a paper; it was really a meteorological chart for the two years, and was made the subject of a few remarks by M. Renou, the most important of which was, that to find a winter of equal intensity of cold to that of 1879-80 it was necessary to go back to 1820.

M. PAMARD (Vice-President of the Meteorological Commission of Vaucluse). *On the March of Cyclones: an Explanation of the Mistral.* —M. Pamard's paper has been printed, and we defer our report until we have had time to abstract the copy with which he has favoured us.

PROF. RAULIN. *On the Seasonal Distribution of Rainfall in Italy.*— Of this paper also we defer our notice.

GENERAL DE NANSOUTY, who is well known for his courageous persistence in his observations on the summit of the Pic du Midi, did

not read a paper; but, at the request of M. Jules Ferry, he gave a short verbal description of the past winter at that lofty station, where he said the weather was quite mild, for while Paris was under a deep bed of snow, he was gathering flowers on the mountain-top.

## THE METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on Wednesday, the 17th instant, at the Institution of Civil Engineers, Mr. G. J. Symons, F.R.S., president, in the chair. Sir A. P. Bruce Chichester, Bart., W. H. Cochrane, Rev. H. Garrett, M.A., H. Jonas, J. Lingwood, Lieut.-Col. L. W. Longstaff, Rev. C. E. Sherard, J. H. Stewart, and Dr. W. J. Treutler were balloted for and duly elected Fellows of the Society. The following papers were read:—1. "Thermometric Observations on Board the Cunard R.M.S.S. *Algeria*," by Capt. William Watson, F.M.S. 2. "On the Greenwich Sunshine Records, 1876-80," by William Ellis, F.R.A.S. At 8 p.m. the discussion was suspended in order to afford the Fellows an opportunity of inspecting a large number of new and interesting meteorological instruments which had been brought together for exhibition.

The following list of the objects exhibited will sufficiently indicate the great interest of the collection:—

| Reference Number. | Objects. | Exhibitors. |
|---|---|---|
| 1. | Hagemann's Anemometer ... ... ... | *The Cowl Committee of the Sanitary Institute.* |
| 2. | ,, ,, with dial removed to show mechanism ... ... | *The Cowl Committee of the Sanitary Institute.* |
| 3. | Station Barometer with metal scale ... | *Mr. P. Adie.* |
| 4. | Dines' Hygrometer, original pattern, for use with iced water ... ... ... | *Mr. Casella, F.M.S.* |
| 5&6. | Do. new pattern, for use with water or spirit ... ... ... | ,, |
| 7. | Sunshine recorder ... ... ... ... | ,, |
| 8. | Casella's Self-recording rain gauge ... | ,, |
| 9. | Bourdon's Thermograph ... ... ... | *Mr. Donkin.* |
| 10. | Sunshine recorder ... ... ... ... | *Mr. R. J. Lecky, F.M.S.* |
| 11. | Cloud reflector ... ... ... ... | *Rev. W. Clement Ley, F.M.S.* |
| 12. | Wild's wind gauge ... ... ... ... | *Mr. R. H. Scott, Sec. M.S.* |
| 13. | M.O. new Fishery Barometer with Kew corrections ... ... ... ... | ,, |
| 14. | Hermann and Pfister's Metallic Max. and Min. Thermometer ... ... ... | ,, |
| 15. | Lamont's Atmometer ... ... ... | ,, |
| 16. | Hagemann's Anemometer ... ... ... | ,, |
| 17. | Lowe's Hygrometer ... ... ... ... | ,, |
| 18. | Set of Sunshine cards ... ... ... | ,, |
| 19. | The Society's Album ... ... ... | *Mr. G. J. Symons, Pres. M.S.* |
| 20. | Redier's Barograph ... ... ... ... | ,, |
| 21. | An undescribed pattern of rain gauge ... | ,, |
| 22. | Map of, and 14 photographs of damage by, the Walmer whirlwind ... ... ... | ,, |
| 23. | Goddard's Cloud Mirror, from the Great Exhibition, 1851... ... ... ... | ,, |
| 24. | Barometer adjunct ... ... ... ... | *Mr. E. White Wallis, F.M.S.* |
| 25. | Copies of Schwabe's sunspot drawings ... | *Mr. G. M. Whipple, F.M.S.* |

## BARBADOS RAINFALL.

*To the Editor of the Meteorological Magazine.*

SIR,—In a letter, dated the 5th inst., from Barbados, I find the following :—

"We have had an extraordinary fall of rain for the month of January, averaging, from 219 stations, 11·13 inches of rain, which is 240 per cent. above the 25 years' average of 3·26 inches ; and our rainfall for last year was also very much in excess of the average, and was at times so heavy and continuous as to produce landslips and subsidences of the soil."

As this may be of some interest, I beg to enclose it.—Yours, &c.,

L. CASELLA.

*London, E.C., 31st March,* 1880.

## SMALL WHIRLWIND.

*To the Editor of the Meteorological Magazine.*

SIR,—My gardeners observed a very curious phenomenon at about 11.30 a.m. on Monday, March 30th. A whirlwind took up a bundle of straw, about 50 yards below where they were standing, and carried it over a beech tree on my lawn, about 60 ft. high ; but there was not the slightest disturbance in the air where they were standing. —I am, dear Sir, yours faithfully,

THOS. DEVAS.

*Mt. Ararat, Wimbledon, April 1st,* 1880.

## MARCH HOAR FROST.—THE RECORD OF —23° AT BLACKADDER.

*To the Editor of the Meteorological Magazine.*

SIR,—I do not remember so late in the season ever seeing such a hoar frost as we had this morning, the rime did not leave the trees until nearly midday ; they were just as beautiful as they were in the winter. As late as ten in the morning the upper sides of the branches were covered with hoar frost about half an inch thick ; when the sun broke through the fog the ice fell from the trees in great lumps ; we registered 25°, or 7 degrees of frost in the morning.

I observe in last month's Magazine, under heading, "The Frost of December," a statement that looks much like a mistake. The min. ther. at Blackadder, Berwickshire, —23°, that is 55 degrees of frost, I can hardly believe it.—I am sir, yours truly,

JOHN MATHISON.

*Addington, March 20th,* 1880.

[The record of —23° is not a misprint, and although excessively low for the British Isles, is so corroborated by other records from the district, and by the effect upon the plants in the immediate neighbourhood that we believe it to be approximately correct, by which we mean, that although there may be an error of 2° or 3° we do not think that it much, if at all, exceeds that amount. We believe that

full details respecting this and other low temperatures, with maps of the districts affected, will be given in the next number of the *Quarterly Journal of the Meteorological Society* and after it has been published we shall be glad to receive any criticisms upon it.—ED.]

## EXCESSIVE RAINFALL IN SKYE IN FEBRUARY.

*To the Editor of the Meteorological Magazine.*

SIR,—The month of February has been most eventful for rainfall, as you will see by the return for month enclosed.

The greatest falls in 24 hours were on 1st, 2·36 in.; 4th, 4·29; 6th, 4·98; 25th, 2·22; and on 29th, 3·25. There were only two days on which no rain fell, viz., 9th and 22nd. The month throughout has been very mild and free from frost. Only one morning slight frost, viz., on 15th; and two days cold and blustery with snow and hail showers. All kinds of stock have done well on hill pasture, and the grass in sheltered places has been growing nearly all the winter. Round the coast here, during the latter part of January and the first ten days of February, large takes of herring were got, nothing to come near it for the last 20 years.

The rainfall at Sligachan during the month of February as read during month amounted to :—Daily gauge, 25·58 in.; monthly gauge, 23·15 in.—I am, sir, yours most obedient,

J. F. BUTTERS.

*Sligachan Hotel, Skye, 1st March*, 1880.

## CLOUD PHOTOGRAPHY.

*To the Editor of the Meteorological Magazine.*

DEAR SIR,—Possibly because I am not a professed meteorologist, I feel some little surprise at Mr. Clement Ley's opinion* that cloud observations are principally valuable as giving information on the subject of atmospheric currents. Important as this branch of the subject undoubtedly is, I cannot but think that the study of the forms and characteristics of clouds must form a most important part of practical weather wisdom, though one which, I fear, scientific meteorologists too often leave to the shepherd and the fisherman. The difficulty of describing intelligibly such varied and indefinite forms, has no doubt greatly hindered the study, but this difficulty does not apply to pictorial representation. I am convinced that any one undertaking a systematic application of photography to the sky, in the same manner as it has been applied to the sun, would be largely rewarded.

It would be easy to devise a panoramic camera to depict the whole heavens on one plate, and with dry plates at hand the labour would not be excessive, as only unusual forms need be photographed. Of course, the register should run side by side with one of colour, altitude, wind, and all the ordinary meteorological data.—I am, &c.,

A FELLOW OF THE CHEMICAL SOCIETY.

* Meteorological Magazine, vol xiv. page 114.

## THE WEATHER IN MARCH.

The first week of the month was characterised by dull and rainy weather. A large depression had its centre between the Shetlands and the west coast of Norway from the 2nd to the 5th, followed by several more on the 6th, all moving across the extreme N. of Great Britain to Norway. On the 8th a general rise of the bar. occurred (and simultaneously a general change from rainy to very fine weather), and an anticyclone was formed over Sweden, pressure being high and uniform over the whole of W. Europe. Temperature during the same period was above the average for time of year everywhere; as much as 5° or 6° over the greater part of England, and 3° or 4° elsewhere. Rainfall also above the mean.

The weather during the next week, although foggy or hazy in the S. and S.E., was generally fine and very dry over England; cloudy and rather rainy in Scotland; dull and showery over the greater part of Ireland.

An uniform and slow decrease in pressure occurred on the 9th, but a sharp recovery took place in the N. on the following day, an area of high pressure being formed near the Shetlands. This area gradually shifted till its centre (30·7) was over S. Sweden and the Baltic on the 13th, and a brisk fall in its rear was reported next day; pressure over these islands meanwhile ranging from from 30·1 to 30·3.

Temperature a little above the mean everywhere, except in N.E. England. The maximum was as high as 63° at Strathfield Turgiss; 60° at Lowestoft, London, and Marlborough; and 59° at Barnstaple. Rainfall below mean over England, but 0·96 above it at Ardrossan; 0·66 in Isle of Man; and 0·56 at Glasgow. The wind was mostly E. or S.E., and light in force.

Dry, fine, and very bright weather prevailed over these islands from 15th to 22nd. An anticyclone lay over Norway and the North Sea on the 16th, 17th, and 18th, gradually spreading eastwards over Great Britain, until on the 22nd it embraced Scandinavia, the North Sea, and nearly the whole of these islands.

Temperature was slightly above the average over Ireland, and all the western parts of Great Britain, about the mean in S. England, and a few degrees below it elsewhere. The minimum was as low as 23° at Durham, Kelstern, and Shrewsbury on the 20th, 25° at Cambridge and Leicester, and 27° at several stations.

The anticyclone maintained itself in much the same position throughout the week (23rd–29th). On the 25th, however, it began gradually to disappear, but the change was arrested on the 27th by a rapid recovery of pressure in the N. of Scandinavia, which caused the anticyclone to spread out on its northern side and extend over the whole of these islands. On the 28th the area began to move slowly southward, and the bar. fell somewhat decidedly in the N., while light breezes from S. and S.W. set in. In the S., however, the bar. continued to rise gradually, with a continuance of light or moderate E. winds. On the 29th pressure became exceedingly uniform, and it was apparent, from the reports of the next day, that a gradual change was in progress. On the 30th the bar. was rising over Scandinavia, France, and the eastern coast of Great Britain, but fell slowly in the W. and N. Next day the mercury fell over the whole of W. Europe, and a large and deep depression appeared over the W. of Scotland. The change was slight over Scandinavia and N. Germany, but rapid on our N.W. coasts.

The changes in temperature from 23rd to the end of the month were, with the exception of the 25th and 29th, slight and irregular. Fog or mist was reported every day after the 23rd, the quantity on the 30th being very considerable. The weather cleared somewhat on the 31st. Rainfall was almost nil.

*Lowestoft.* H. E. M.

# SUPPLEMENTARY TABLE OF RAINFALL IN MARCH, 1880.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

| Div. | STATION. | Total Rain. | Div. | STATION. | Total Rain. |
|---|---|---|---|---|---|
| | | in. | | | in. |
| II. | Dorking, Abinger ..... | ·92 | XI. | Corwen, Rhug ..... | 3·26 |
| ,, | Margate, Acol ..... | ... | ,, | Port Madoc ..... | 2·63 |
| ,, | Littlehampton ..... | ·90 | ,, | Douglas..... | 2·81 |
| ,, | St. Leonards ..... | ·68 | XII. | Carsphairn ... ..... | 3·33 |
| ,, | Hailsham ..... | ·50 | ,, | Melrose, Abbey Gate... | 2·63 |
| ,, | I. of W., St. Lawrence. | ·91 | XIV. | Glasgow, Queen's Park. | ... |
| ,, | Alton, Ashdell..... | ... | XV. | Islay, Gruinart School.. | 3·20 |
| III. | Great Missenden ..... | ·67 | XVI. | Cupar, Kemback..... | 2·20 |
| ,, | Winslow, Addington ... | 1·79 | ,, | Aberfeldy H.R.S. ..... | 3·08 |
| ,, | Oxford, Magdalen Col... | 1·15 | XVII. | Tomintoul..... | ·59 |
| ,, | Northampton ..... | 1·31 | ,, | Keith H.R.S. ..... ..... | ·89 |
| ,, | Cambridge, Merton Vil. | ·91 | ,, | Forres H.R.S. ..... | 1·14 |
| IV. | Harlow, Sheering ..... | 1·01 | XVIII. | Strome Ferry H.R.S.... | 2·50 |
| ,, | Diss ..... | ·64 | ,, | Auchnasheen H.R.S. ... | ... |
| ,, | Swaffham ..... | ·95 | ,, | Lochbroom ..... | 1·55 |
| ,, | Hindringham ..... | 1·22 | ,, | Tain, Springfield..... | ·91 |
| V. | Salisbury, Alderbury... | ·76 | ,, | Loch Shiel, Glenfinnan. | 6·36 |
| ,, | Calne, Compton Bassett | 1·96 | ,, | Dalwhinnie H.R.S..... | ... |
| ,, | Beaminster Vicarage ... | 1·75 | XIX. | Lairg H.R.S. ..... | 1·33 |
| ,, | Dartmoor, Princetown.. | ... | ,, | Altnabreac H.R.S. ..... | 1·15 |
| ,, | Langtree Wick ..... | 1·99 | ,, | Watten H.R.S. ..... | 1·44 |
| ,, | Lynmouth, Glenthorne. | 3·43 | XX. | Fermoy, Glenville ..... | 3·63 |
| ,, | St. Austell, Cosgarne... | 3·31 | ,, | Tralee, Castlemorris ... | 1·57 |
| ,, | Taunton ..... | 1·70 | ,, | Cahir, Tubrid ..... | 2·18 |
| VI. | Bristol, Ashleydown ... | 2·44 | ,, | Tipperary, Henry St.... | 2·44 |
| ,, | Ross ..... | 1·24 | ,, | Newcastle West ..... | 2·15 |
| ,, | Wem, Sansaw Hall..... | ·96 | ,, | Kilrush ..... | 2·28 |
| ,, | Cheadle, The Heath Ho. | 2·27 | ,, | Corofin ..... | 5·20 |
| ,, | Bickenhill Vicarage ... | 1·60 | XXI. | Kilkenny, Butler House | ... |
| VII. | Melton Mowbray ..... | 1·57 | ,, | Carlow, Browne's Hill.. | 4·11 |
| ,, | Horncastle, Bucknall ... | 1·92 | ,, | Kilsallaghan..... | ... |
| VIII. | Walton-on-the-Hill..... | 2·27 | ,, | Navan, Balrath ..... | 3·61 |
| ,, | Broughton-in-Furness .. | 3·20 | ,, | Athlone, Twyford ..... | 3·89 |
| IX. | Wakefield, Stanley Vic. | 2·31 | ,, | Mullingar, Belvedere ... | 3·63 |
| ,, | Ripon, Mickley ..... | 2·06 | XXII. | Ballinasloe ..... | ... |
| ,, | Scarborough..... | 1·89 | ,, | Clifden, Kylemore ..... | 6·16 |
| X. | Mickleton..... | 2·02 | ,, | Crossmolina, Enniscoe.. | 3·90 |
| ,, | Haltwhistle, Unthank.. | 1·04 | ,, | Carrick-on-Shannon ... | 1·95 |
| ,, | Shap, Copy Hill ..... | 2·79 | XXIII. | Dowra ..... | 2·03 |
| XI. | Llanfrechfa Grange ..... | 2·85 | ,, | Rockcorry..... | 2·11 |
| ,, | Llandovery ..... | 3·07 | ,, | Warrenpoint ..... | 3·44 |
| ,, | Solva ..... | 1·74 | ,, | Newtownards ..... | 1·88 |
| ,, | Castle Malgwyn ..... | 2·21 | ,, | Carnlough..... | ... |
| ,, | Rhayader, Nantgwillt.. | 3·62 | ,, | Bushmills ..... ..... | 1·57 |
| ,, | Carno, Tybritle ... ..... | 2·52 | ,, | Buncrana ..... | 1·98 |

# MARCH, 1880.

| Div. | | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. Total Fall. | Difference from average 1860–5 | Greatest Fall in 24 hours. Dpth | Greatest Fall in 24 hours. Date. | Days on which ·01 or more fell. | TEMPERATURE. Max. Deg. | Max. Date. | Min. Deg. | Min. Date. | No. of Nights below 32° In shade. | No. of Nights below 32° On grass. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | inches | inches. | in. | | | | | | | | |
| I. | ENGLAND. | Camden Square | ·79 | — 1·29 | ·31 | 31 | 5 | 62·6 | 26 | 28·7 | 28 | 4 | 17 |
| II. | | Maidstone (Hunton Court) | ·38 | — 1·78 | ·18 | 31 | 5 | ... | ... | ... | ... | ... | ... |
| ,, | | Strathfield Turgiss | ·94 | ... | ·39 | 31 | 5 | 64·3 | 26 | 22·3 | 29 | 8 | 20 |
| III. | | Hitchen | ·86 | — 1·31 | ·34 | 31 | 5 | 57·0 | 30 | 24·0 | 28 | 14 | ... |
| ,, | | Banbury | 1·44 | — ·76 | ·60 | 31 | 5 | 60·5 | 25 | 25·0 | 20 | 14 | ... |
| IV. | | Bury St. Edmunds (Culford) | ·98 | — 1·22 | ·42 | 31 | 5 | 61·0 | 31 | 25·0 | 19 | 13 | 19 |
| ,, | | Norwich (Cossey) | ·72 | — 1·63 | ·34 | 31 | 7 | 60·5 | 5 | 26·0 | 25 | 12 | 14 |
| V. | | Bridport | 1·33 | — 1·54 | ·44 | 31 | 8 | ... | ... | ... | ... | ... | ... |
| ,, | | Barnstaple | 1·73 | — 1·42 | ·46 | 31 | 15 | 66·0 | 31 | 33·0 | 29* | 0 | ... |
| ,, | | Bodmin | 2·85 | — ·90 | ·84 | 25 | 18 | 60·0 | 27 | 33·0 | 24 | 0 | 6 |
| VI. | | Cirencester | 2·09 | — ·51 | 1·15 | 2 | 6 | ... | ... | ... | ... | ... | ... |
| ,, | | Shifnal (Haughton Hall) | 1·11 | — ·83 | ·32 | 2 | 10 | 58·0 | 5 | 26·0 | 20‡ | 11 | 13 |
| ,, | | Tenbury (Orleton) | 1·52 | — ·90 | ·60 | 31 | 9 | 64·5 | 29 | 25·8 | 29 | 12 | 19 |
| VII. | | Leicester (Town Museum) | 1·42 | ... | ·64 | 31 | 7 | 61·2 | 29 | 24·8 | 20 | 6 | 25 |
| ,, | | Boston | 1·40 | — ·39 | ·63 | 31 | 8 | 62·0 | 29 | 28·0 | 20 | 5 | ... |
| ,, | | Grimsby (Killingholme) | 2·41 | ... | 1·11 | 2 | 11 | 56·0 | 5 | 30·0 | 20 | 1 | ... |
| ,, | | Mansfield | 2·30 | ... | ·96 | 31 | 8 | 59·6 | 29 | 26·6 | 20 | 9 | 14 |
| VIII. | | Manchester (Ardwick) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| IX. | | York | 2·58 | + ·59 | 1·06 | 31 | 10 | 69·0 | 4 | 27·0 | 24 | 4 | 6 |
| ,, | | Skipton (Arncliffe) | 4·22 | — ·59 | 1·16 | 31 | 12 | 58·0 | 28 | 26·0 | 18 | 13 | ... |
| X. | | North Shields | 1·64 | — ·71 | ·80 | 31 | 8 | 56·0 | 5 | 27·6 | 20 | 4 | 4 |
| ,, | | Borrowdale (Seathwaite) | 7·16 | — 6·24 | 2·05 | 31 | 11 | ... | ... | ... | ... | ... | ... |
| XI. | WALES. | Cardiff | 1·90 | ... | ·75 | 2 | 12 | 60·0 | 25 | 28·6 | 29 | 2 | ... |
| ,, | | Haverfordwest | 2·79 | — ·66 | ·76 | 15 | 14 | 56·2 | 30 | 27·8 | 28 | 6 | 15 |
| ,, | | Aberdovey | 1·10 | ... | ·32 | 12 | 9 | ... | ... | ... | ... | ... | ... |
| ,, | | Llandudno | 2·14 | — ·12 | ·79 | 1 | 6 | 59·5 | 25 | 31·7 | 24 | 1 | ... |
| XII. | SCOTLAND. | Cargen | 1·91 | — 1·19 | ·52 | 12 | 8 | 59·4 | 19 | 26·8 | 24 | 13 | ... |
| ,, | | Hawick (Silverbut Hall) | 1·62 | ... | ·43 | 31 | 9 | ... | ... | ... | ... | ... | ... |
| XIV. | | Douglas Castle (Newmains) | 2·58 | ... | ·66 | 12 | 9 | ... | ... | ... | ... | ... | ... |
| XVI. | | Loch Long (Arddaroch) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Kilmory | 4·74 | ... | ·92 | 30 | 9 | ... | ... | 26·0 | 24 | 12 | ... |
| ,, | | Mull (Quinish) | 2·68 | ... | ·55 | 5 | 11 | ... | ... | ... | ... | ... | ... |
| ,, | | Loch Leven | 2·50 | — ·32 | 1·10 | 13 | 7 | ... | ... | ... | ... | ... | ... |
| XVII. | | Arbroath | 2·11 | + ·07 | ·75 | 12 | 10 | 55·0 | 29 | 30·0 | 19§ | 2 | ... |
| ,, | | Braemar | 1·56 | — ·65 | ·76 | 11 | 10 | 59·6 | 19 | 11·0 | 25 | 20 | 29 |
| XVIII | | Aberdeen (Rose Street) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Portree | 3·22 | — 5·82 | 1·07 | 5 | 11 | ... | ... | ... | ... | ... | ... |
| ,, | | Inverness (Culloden) | 1·32 | — ·64 | ·55 | 13 | 7 | 55·0 | 29* | 26·5 | 27 | 11 | 23 |
| XIX. | | Dunrobin | 1·61 | — 1·01 | ·67 | 12 | 8 | 56·0 | 29 | 29·0 | 3 | 8 | ... |
| ,, | | Sandwick | 2·91 | — ·42 | 1·25 | 12 | 10 | 50·2 | 8,18 | 33·3 | 19 | 0 | 9 |
| XX. | IRELAND. | Cork | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Darrynane Abbey | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Waterford | 4·46 | + 1·57 | 1·09 | 16 | 17 | 57·0 | 3 | 30·0 | 30 | 3 | ... |
| ,, | | Killaloe | 4·91 | + ·59 | 1·78 | 1 | 14 | 68·0 | 29 | 27·0 | 23 | 5 | ... |
| XXI. | | Portarlington | 3·84 | + ·53 | ·86 | 2 | 20 | 59·5 | 21 | 29·5 | 23 | 7 | ... |
| ,, | | Monkstown | 3·29 | + ·71 | 1·13 | 2 | 15 | ... | ... | ... | ... | ... | ... |
| XXII. | | Galway | 3·32 | ... | 1·31 | 1 | 17 | 61·0 | 21† | 30·0 | 23 | 3 | ... |
| XXIII | | Waringstown | 2·24 | ... | ·65 | 11 | 11 | 61·0 | 29 | 28·0 | 27 | 8 | 14 |
| ,, | | Londonderry | 1·99 | ... | ·59 | 4 | 14 | 59·5 | 20 | 31·8 | 23 | 1 | 13 |
| ,, | | Edenfel (Omagh) | 2·56 | ... | ·67 | 4 | 17 | 60·0 | 27 | 28·0 | 8 | 11 | ... |

* And 30. † And 22. ‡ And 29. § And 20.

\+ Shows that the fall was above the average; — that it was below it.

# METEOROLOGICAL NOTES ON MARCH.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

## ENGLAND.

STRATHFIELD TURGISS.—A fine dry blusterous month, but cold at night; generally very favourable for agricultural work. First plover seen on 3rd; Mercurialis perennis in flower on 4th, Tussilago farfara in flower on 5th; first honey bee seen on 9th, first wasp on 10th, and first humble bee on 13th; wood anemone in flower on 11th, horse chestnut in leaf on 14th, Lamium album in flower on 21st.

BANBURY.—High winds on 1st, 2nd, 3rd, 5th and 8th. Slight fog on 20th.

CULFORD.—The month was distinguished by drought and a prevalence of cold east winds. Rather high S.W. wind on the first four days, Mean temp. 39°·7. T on 9th, hoar frost on 10th. Heavy fog on 12th and 14th.

BODMIN.—A very genial month. Mean temp. 47°·9

CIRENCESTER.—Stormy with heavy rain on 2nd, followed by a long continuance of fine weather. Prevailing wind S.E.

SHIFNAL.—The month came in in its true character. Violent wind from S.W. with R and H S or sleet till the 5th. On the 8th the wind changed to E. and S.E. with bright sun and frost; it continued from this quarter with slight rain at times till the close. Thick fogs in the mornings from 10th to 16th, clearing into bright sunshine. Hard frost with ice on nights of 19th and 28th. Clouds of dust; fine time for farmers to clear their ground and get in their barley. Rooks busy; and gooseberry buds bursting on 3rd. Yellow tipped humble bee out on 8th. Willow opening and celandine flowers on 22nd. Chiff chaff arrived on 26th, hawthorn buds bursting on 27th. First white butterfly seen on 30th.

ORLETON.—A very fine month for agricultural work with drying wind and much sun. The first twelve days were warmer than the average, but on the 13th the wind changed to N. and E. with frosty nights and sunny days and a lower temp., but no rain fell from the 12th to the 29th. The mean temp. of the month was very near the average. The max. and min. occurred on the same day, the 29th. The bar. was generally high and steady with a prevalence of easterly wind. On the 2nd the wind was very great from S.S.W.

LEICESTER.—Fog on mornings of 14th, 20th, and 23rd, and on evening of 13th; hoar frost on morning of 20th.

BOSTON.—March was a very fine month with drying winds, and during the last half of the month very little rainfall. The weather was generally very favourable for preparing the land for sowing spring corn. The temp. was about 2° above the average and the rainfall a little below. On the 2nd there was a slight fall of S. and during the night a violent storm accompanied by T. The thorn hedges began to burst into leaf about the middle of the month, and primroses and violets came into flower in sheltered places about the same time.

KILLINGHOLME.—Another month of seasonable weather though often very cold; easterly winds prevailing during the greater part. R on the first few days, and on the last day; the rest of the month very dry. Yews shedding pollen, and wild violets plentiful on 6th. Frogs spawning on 10th.

MANSFIELD.—S on 2nd. TS at 2 a.m. on 3rd. Hoar frost on 8th and 13th. Fog on seven days.

ARNCLIFFE.—An unusual prevalence of E. and S.E. wind.

SEATHWAITE.—I do not remember such weather in March for 20 years. Clear and cloudless with frost at night about the 16th. Glorious weather with frost at night about the 27th. The weather turned cold on 31st.

## WALES.

HAVERFORDWEST.—The month commenced very rough and cold; terrific squalls with H during the evening of the 1st. The stormy weather lasted till the 6th, after which it became milder. From the 14th to 16th it was again cold, with some heavy rain and strong E. winds, but after the 16th the weather

was remarkably fine and bright, with sharp frosts at night, the min. on grass being as low as 20° on the 24th. On the 28th the wind suddenly veered from E.S.E. to N.W., and there was a dense fog all night. At 8 a.m. on the 29th the temp. was only 27°·9; the day was fine, but the wind changed to S.W., and the month closed with a heavy fall of R and milder air.

ABERDOVEY.—First half of month wind westerly; second half prevailing wind easterly.

LLANDUDNO.—The first two days were stormy, but with this exception March was a remarkably fine month, and characterized by a large amount of sunshine. The mean temp. was 4° above the average, and the rainfall just about the average, but the greater part of it fell on the 1st, 2nd, and 31st. Only one night's frost. H and sleet on 1st; S on hills. S in night on 2nd.

SCOTLAND.

CARGEN.—A fine month; 178 hours of sunshine, as compared with an average of 137. Sharp frosts at night between 17th and 28th. Mean temp. of month 2° above average.

HAWICK.—Farmers have scarcely ever had more favourable weather for seed sowing, but pastures are not so green as they were three weeks ago. A good shower would be acceptable, and would give an impulse to vegetation. S, sleet, and R on 1st and 2nd; S 3 in. deep on ground on 3rd.

DOUGLAS CASTLE.—Thunder about 1 a.m. on 2nd.

QUINISH.—A fine month on the whole, neither cold nor very wet.

BRAEMAR.—A dry but cold month, very favourable for seed operations.

PORTREE.—First ten days cold and squally with H and S, then strong sun by day and severe frosts at night till 28th, and wet and cold to end of month.

CULLODEN.—Month fine from the 13th to the close; weather very dry.

SANDWICK.—The weather in March was generally uncommonly fine, more like summer than spring, though the rainfall was slightly greater than the mean of the previous 39 years, and the fall on the 12th was greater than any fall since September 26th, 1875. There was a gale of 50 to 55 miles an hour on the 2nd and 3rd, and another on 31st, which at the strongest was about 60 miles an hour. Auroræ on 14th and 17th. March dust was abundant in the latter part of the month, so that farmers got a quantity of seed sown. A striking contrast to March last year, when the ground was under snow for a great part of the time.

IRELAND.

MONKSTOWN.—The month commenced with heavy showers of sleet, H and S with heavy squalls. This was followed by milder showery weather till the 16th, from which date to the 25th the days were fine and bright, with cold easterly wind and frequent frosts at night; the remainder of the month was warmer and moister, the last two or three days being almost like summer.

LONDONDERRY.—On the whole a very mild and genial month. Wind principally southerly.

## A DRY PERIOD.

*To the Editor of the Meteorological Magazine.*

SIR,—As the last six months have been the driest I have ever recorded, I thought you might like a copy of my register.

| | | |
|---|---|---|
| 1879. | October ..... | ·660 in. |
| ,, | November ..... | 1·375 ,, |
| ,, | December ..... | ·570 ,, |
| 1880. | January ..... | ·095 ,, |
| ,, | February ..... | 1·275 ,, |
| ,, | March ..... | ·750 ,, |
| | | 4·725 in. |

—Yours truly, JOHN BYNG.

*Boxford Rectory, Colchester, April 1st*, 1880.